CLAIMS

1. (Currently Amended) A method of processing encoded data comprising one or more blocks of samples ~~generating probabilities to calculate log-likelihood values in a maximum *a posteriori* (MAP) processor for samples corresponding to data~~, the method comprising the steps of:

(a) receiving the encoded data;

(b) ~~(a)~~ retrieving a first block of samples from the encoded data and a corresponding set of forward probabilities, wherein the block of samples correspond to states of a merged trellis, wherein the merged trellis provides combined probabilities of transition from one or more states at k-N, N an integer greater than 1, to current states at time k as the set of forward probabilities; and

(c) ~~(b)~~ updating the set of forward probabilities of the merged trellis for the current state at time k, based on the block of samples and the corresponding set of forward probabilities;

wherein updating the forward probability for a state in step (c) ~~(b)~~ comprises the step of selecting the maximum combined probability for transitions to the current state, given by:

$$A_j^k = \max^*_{i=0,1,\ldots,7}(A_i^{k-N} + \tilde{\Gamma}^k_{i,j}) \qquad \text{for } j = 0,1,\ldots,\text{M-1},$$

where $\tilde{\Gamma}^k_{i,j}$ is the combined probability obtained by adding N individual branch ~~matrices~~ metrics from time k-N to time k in an original trellis, and M is the number of states;

(d) using the maximum combined probability A_j^k to calculate one or more log-likelihood values in a maximum *a posteriori* (MAP) processor for one or more blocks of samples corresponding to the data; and

(e) detecting or decoding the encoded data using the one or more log-likelihood values.

2. (Currently Amended) The invention as recited in claim 1, further comprising the steps of:

(f) ~~(e)~~ retrieving a second block of samples and a corresponding set of backward probabilities, wherein the samples correspond to states of the merged trellis, wherein the merged trellis provides cumulative probabilities of transition from one or more states at time k+N to current states at time k as the set of backward probabilities; and

(g) ~~(d)~~ updating the set of backward probabilities of the merged trellis for the current state at time

k, based on the block of samples and the corresponding set of backward probabilities.

3. (Original) The invention as recited in claim 2, further comprising the steps of computing log-likelihood values from the updated forward and backward probabilities and generating a data sequence for one or more blocks of samples corresponding to the log-likelihood values.

4. (Original) The invention as recited in claim 1, further comprising the step of storing in or reading from a memory each block of sample values for each update in step (a)

5. (Cancelled)

6. (Cancelled)

7. (Original) The invention as recited in claim 1, wherein the method is employed during a step of either maximum *a posteriori* (MAP) detection or MAP decoding of received samples.

8. (Original) The invention as recited in claim 1, wherein the method is implemented by a processor in an integrated circuit.

9. (Currently Amended) Apparatus for processing encoded data comprising one or more blocks of samples ~~generating probabilities to calculate log-likelihood values corresponding to data~~, the apparatus comprising:

a maximum *a posteriori* (MAP) processor comprising:

a first module retrieving a first block of samples from the encoded data and a corresponding set of forward probabilities, wherein the block of samples correspond to states of a merged trellis, wherein the merged trellis provides combined probabilities of transition from one or more states at k-N, N an integer greater than 1, to current states at time k as the set of forward probabilities; and

a second module updating the set of forward probabilities of the merged trellis for the current state at time k, based on the block of samples and the corresponding set of forward probabilities;

wherein the second module updates the forward probability for a state in step (b) by selecting the maximum combined probability for transitions to the current state, given by:

$$A_j^k = \max^*_{i=0,1,\ldots,7}(A_i^{k-N} + \tilde{\Gamma}_{i,j}^k) \qquad \text{for } j = 0,1,\ldots,\text{M-1},$$

where $\tilde{\Gamma}_{i,j}^k$ is the combined probability obtained by adding N individual branch ~~matrices~~ metrics from time k-N to time k in an original trellis, and M is the number of states;

wherein the MAP processor is adapted to:

use the maximum combined probability A_j^k to calculate one or more log-likelihood values for one or more blocks of samples corresponding to the data; and

detect or decode the encoded data using the one or more log-likelihood values..

10. (Original) The invention as recited in claim 9, wherein the MAP processor further comprises:

a third module retrieving a second block of samples and a corresponding set of backward probabilities, wherein the samples correspond to states of the merged trellis, wherein the merged trellis provides cumulative probabilities of transition from one or more states at time $k+N$ to current states at time k as the set of backward probabilities; and

a fourth module updating the set of backward probabilities of the merged trellis for the current state at time k, based on the block of samples and the corresponding set of backward probabilities.

11. (Original) The invention as recited in claim 10, wherein the MAP processor is configured to 1) compute log-likelihood values from the updated forward and backward probabilities and 2) generate a data sequence for one or more blocks of samples corresponding to the log-likelihood values.

12. (Original) The invention as recited in claim 9, further comprising a memory, wherein the MAP processor stores in or reads from the memory each block of sample values for each update.

13. (Cancelled)

14. (Cancelled)

15. (Original) The invention as recited in claim 9, wherein the apparatus is a circuit embodied in an integrated circuit.

16. (Currently Amended) A ~~computer~~ machine-readable medium having stored thereon a plurality of machine-readable instructions, the plurality of instructions including instructions which, when executed by a processor, cause the processor to implement a method for processing encoded data comprising one or more blocks of samples ~~generating probabilities to calculate log-likelihood values in a maximum *a posteriori* (MAP) processor for samples corresponding to data for generating log-likelihood values for data in a maximum *a posteriori* (MAP) processor~~, the method comprising the steps of:

(a) receiving the encoded data;

(b) ~~(a)~~ retrieving a first block of samples from the encoded data and a corresponding set of forward probabilities, wherein the block of samples correspond to states of a merged trellis, wherein the merged trellis provides combined probabilities of transition from one or more states at k-N, N an integer greater than 1, to current states at time k as the set of forward probabilities; and

(c) ~~(b)~~ updating the set of forward probabilities of the merged trellis for the current state at time k, based on the block of samples and the corresponding set of forward probabilities;

wherein updating the forward probability for a state in step (c) ~~(b)~~ comprises the step of selecting the maximum combined probability for transitions to the current state, given by:

$$A_j^k = \max^*_{i=0,1,\ldots,7}(A_i^{k-N} + \tilde{\Gamma}^k_{i,j}) \qquad \text{for } j = 0,1,\ldots,\text{M-1},$$

where $\tilde{\Gamma}^k_{i,j}$ is the combined probability obtained by adding N individual branch ~~matrices~~ metrics from time k-N to time k in an original trellis, and M is the number of states;

(d) using the maximum combined probability A_j^k to calculate one or more log-likelihood values in a maximum *a posteriori* (MAP) processor for one or more blocks of samples corresponding to the data; and

(e) detecting or decoding the encoded data using the one or more log-likelihood values.

17. (Currently Amended) The invention as recited in claim 16, wherein the method further comprises ~~comprising~~ the steps of:

(f) ~~(e)~~ retrieving a second block of samples and a corresponding set of backward probabilities, wherein the samples correspond to states of the merged trellis, wherein the merged trellis provides cumulative probabilities of transition from one or more states at time k+N to current states at time k as the set of backward probabilities; and

(g) ~~(d)~~ updating the set of backward probabilities of the merged trellis for the current state at time k, based on the block of samples and the corresponding set of backward probabilities.